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ABSTRACT

Two primary lines of investigation are involved in this study of elementary school teacher effectiveness. The first focuses on individual differences in students and how these affect teacher expectations, attitudes, and behavior, and the process involved in the formation and change of expectations and attitudes. The overwhelming conclusion that the data supports is that the vast majority of teacher perceptions are accurate and based on student behavior. In those rare cases where persistently incorrect and dysfunctional perceptions are formed, the problem can be solved by building a data base to create understanding and awareness of how these problems develop. The second line of investigation focuses on the question of teacher effectiveness, particularly in producing student learning gains. The results of the analyses indicate that relative differences in teacher effectiveness were statistically significant and reaffirmed the feasibility of identifying highly consistent teachers and studying them to seek associations between classroom process variables and student outcomes. In studying the correlates of teaching effectiveness, one basic finding was that, for many variables, teacher behavior optimal for producing student learning gains in low socioeconomic status (SES) schools was different from teacher behavior optimal for producing learning gains in high SES schools. (JMF)

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REFLECTIONS ON RESEARCH IN ELEMENTARY SCHOOLS[1]

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Reflections on Research in Elementary Schools

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My research at the Research and Development Center for Teacher Education has included several separate studies grouped under the title, "Correlates of Effective Teaching." The different studies have been distinct but related, planned to develop a broader data base for understanding what goes on in classrooms. Some of the work has been experimental, but most of it has been observational and descriptive. This reflects our belief that research on teaching is still in its infancy. Consequently, we have been stressing hypothesis generating studies, developing coding systems for describing and measuring what goes on in classrooms accurately, and developing hypotheses about the relationships among different classroom variables. Two primary lines of investigation are involved, both conducted in collaboration with Dr. Carolyn M. Evertson.

The first, which is a continuation and expansion of work done previously in collaboration with Dr. Thomas L. Good, focuses on individual differences in students and on how these individual differences affect teacher expectations, attitudes, and behavior. The initial impetus for this work came from the famous study Pygmalion in the Classroom (Rosenthal and Jacobson, 1968). However, they used experimental treatments to induce expectations in teachers, and they focused on outcomes rather than on mediating processes. In contrast, our approach has been to measure the naturalistically preexisting expectations and attitudes of teachers, and to focus primarily on the relationships between these variables and measures of teacher-student interaction.

Several studies conducted over a period of years indicate that teachers' expectations sometimes do function as self-fulfilling prophecies, but not necessarily. In fact, this probably occurs in a minority of instances. Also,

these studies revealed some of the mediating processes involved when self-fulfilling prophecy effects do occur.

For example, teachers with low expectations sometimes act in ways which minimize student achievement. These include providing low expectation students with less praise and more criticism, providing less feedback and individualized attention, calling on them to respond less frequently and being less willing to wait patiently for an answer if one is not given immediately, and refusing to allow them even to attempt difficult work, on the grounds that they couldn't succeed at it anyway.

In short, investigations by ourselves and others have revealed that when self-fulfilling prophecies occur, they happen because teachers treat low expectation students by expecting less from them and teaching less to them. Unsurprisingly, these students learn less than comparable students taught more optimally.

One of the major themes of this line of research is that most such teacher behavior is unconscious. Furthermore, the reason seems to be that, until very recently at least, teacher education programs and textbooks had very little to say about differential treatment of different students or about how inappropriate expectations or attitudes can cause teachers to behave in self-defeating ways. Presently a data base exists, which continues to grow regularly, indicating <u>how</u> teachers treat students inappropriately <u>when</u> they allow their expectations or attitudes to interfere with optimal interaction and instruction.

As these data become part of teacher training programs and textbooks, we expect that the problems of undesirable self-fulfilling prophecy effects will be minimized. This is because we (and others) have found in experimental work that, when teachers are acting in self-defeating ways without being aware that

they are doing so, they very quickly change their behavior if the problem is called to their attention.

That is, once teachers are aware of and thus capable of monitoring their own behavior in a particular domain (such as the relative frequencies with which they praise different students), they begin to act in accordance with their beliefs about correct or optimal procedures. Unless the behavior involved is unusually complex and difficult to master, it usually is enough simply to call teachers' attention to discrepancies between their present behavior and their stated goals. Assuming that the discrepancies are real and obvious, the vast majority of teachers will change their behavior immediately (Brophy & Good, 1974; Good and Brophy, 1974).

As we were studying the processes that mediate expectation effects, we became more and more intrigued with questions about how expectations and attitudes are formed in the first place. Eventually this led to a change in emphasis from studying the processes involved in the mediation of expectation effects to the processes involved in the formation and change of expectations and attitudes. This reflects our growing awareness of and emphasis on the degree to which students condition teachers. Of course, everyone realizes that interaction involves the opportunity for each party to influence the other, but research and writing on teacher-student interaction has concentrated heavily on the teacher as cause and the student as effect. As our investigations of classroom dynamics continue, we have become increasingly impressed with the degree to which the opposite causal chain occurs.

So far, it is clear that students influence teachers just as teachers influence students, and that the degrees and kinds of such influence vary with individual differences in students and especially in teachers. Some teachers

appear to be consistent across time and situations, remaining relatively impervious to the differential demands and challenges that different students present. In contrast, others appear to be almost entirely conditioned by their students, showing little consistency across time or even situations. We have not yet learned much about the teacher individual differences involved here, but we have conducted a large study, called the Student Attribute Study, designed to provide some answers to the broad question "What student characteristics do teachers notice and use in forming attitudes and expectations?"

To find out, we asked teachers in grades one through four in several schools to rank their students on 13 bipolar scales of student attributes known or believed to influence teacher attitudes and expectations. This was done three times, spread across the school year. The next year, when these same children were in grades two through five, we asked their new teachers to rank them on the same scales. Then, after we had five separate sets of rankings from two different teachers, we were able to identify those children who were consistently high, medium, or low on each of the 13 scales across five rankings from two different teachers. We also observed each classroom for about 25 hours, studying the classroom behavior and the nature of teacher-student interaction of these students who were perceived consistently by their teachers. Presently, we are analyzing these data, which are both very fascinating and very informative.

It would be impossible to summarize all of the results here, except to say that the overwhelming conclusion which the data support is that the vast majority of teacher perceptions are accurate and based on student behavior. They are not the wildly inaccurate or biased perceptions which might occur if most teachers had poor reality contact, extreme biases against children of the opposite sex or of different races or ethnic groups, and so on.

It is true that teacher perceptions show more halo effects than perceptions of same children by relatively uninvolved classroom observers. It also is true that teacher perceptions are influenced by student achievement and classroom conduct, two student characteristics especially relevant to teachers because of the roles they play in the classroom.

Thus, while teacher perceptions are somewhat inaccurate, the inaccuracies tend to involve halo effects caused by teacher preoccupation with student characteristics particularly relevant to teacher and student roles. These student characteristics are perceived accurately for the most part, however. They detract from the validity of teacher perceptions only in the sense that they are given undue weight and thus produce halo effects and logical errors in teachers' ratings of students on other characteristics that have no direct relationships to these aspects of school performance.

In summary, this line of research has established that teachers can develop rigid and inaccurate expectations, treat students consistently on the basis of these expectations, and ultimately influence them to come to fulfill those expectations, even though the expectations were incorrect initially. The same kinds of effects can occur when teachers form rigid but inappropriate attitudes towards students or beliefs about students. However, data from several studies indicate rather clearly that, although these kinds of effects do occur, they occur relatively rarely. Most teacher perceptions are based on actual behavior rather than on bias or misinformation, and most are flexible enough to be changed if the teacher discovers that first impressions were incorrect (Brophy and Good, 1974; Willis, 1972).

Finally, to the extent that teacher perceptions are persistently incorrect and disfunctional, there is every reason to believe that the problem can be

solved by building a data base to create understanding and awareness of how these problems develop. We already know something about how teachers act once such rigid but incorrect impressions have been formed, and we presently are investigating how such impressions get formed in the first place. Our hope and expectation is that, once a sufficient data base has been developed, procedures for minimizing undesirable expectation and attitude effects can be developed.

For pre-service teachers, this mostly would involve inclusion of more content on classroom dynamics in textbooks, and perhaps some exercises designed to raise consciousness concerning personal preferences and reactions which are likely to become involved in the formation of impressions about students. For in-service teachers, we hope to develop simple but effective procedures for measuring the degree to which teacher impressions of students are accurate, and to provide teachers with useful feedback and prescriptive directions for change in situations where they are not. In any case, teacher awareness seems to be the key here.

The Question of Relative Teacher Effectiveness

Most of the rest of our efforts on this project have been directed at aspects of the question of teacher effectiveness, particularly effectiveness in producing student learning gains. Again, the primary impetus for this series of studies has been the recognition of the need for a data base upon which teachers could draw for diagnosing learning problems and making decisions about how to react to them. It is exasperating and puzzling, but nevertheless true, that relatively little is known about effective teaching, despite 75 years of research on the topic. Advances in methodology and conceptualization in the last 15 years or so have begun to make a difference (Dunkin & Biddle, 1974; Rosenshine and Furst, 1973), but this line of research still is in its infancy.

Several studies, including the famous Coleman Report (Coleman, et al., 1966), reached the surprising conclusion that teachers appeared to have no effects at all upon students. This counter-intuitive conclusion was reached on the basis of data showing that, once student abilities were taken into account by adjusting student achievement scores, teacher variables did not relate significantly to student learning. Such data seemed to imply that student ability and other student characteristics determine learning, and that teaching has no significant effects. There are many problems in the conceptualization and design of studies which support this conclusion, and it is now clear that the conclusion is incorrect. Teachers do make a significant difference, both absolutely and relatively (Good, Biddle, & Brophy, 1975).

In any case, it is with this question that the present line of investigations began. Rosenshine (1970) reviewed five studies which contained information on stability of teacher effectiveness across semesters or school years, and reported that there was virtually no stability. If these data were correct, the implication would have been that terms like "master teacher" or "effective teacher" have no meaning. A teacher who got very good results one year would be no more likely to get good results the next year than any other teacher!

However, among other problems, these data involved teachers who were using new curricula and/or student teachers or first year teachers. These kinds of teachers are known to be unstable in their classroom behavior, because they are (appropriately) adjusting to new and unfamiliar demands. Given this, it seemed reasonable to expect that a study of stability of teacher effectiveness which used experienced teachers would show more promising results. This is where the present line of research began.

Data on 88 second grade teachers and 77 third grade teachers who had taught in their respective grades for at least four consecutive years were analyzed

for teacher stability in relative effectiveness in producing student learning gains on the Metropolitan Achievement Tests. The school district administered the test each fall. Data were collected and collated for each teacher, and mean residual gains were computed by using student scores from the beginning of the school year as covariables to adjust post-scores taken the following fall when they began the next grade.

These scores were computed separately by sex and by each of five subtests of the MAT battery (three language arts and two math), separately for each of three consecutive years of teaching, and separately for Title I schools and for non-Title I schools (because different versions of the tests were used in these two types of schools). The analyses did show the expected increase in stability coefficients. Although there was much variability among subgroups, most coefficients were in the .30 to .40 range. This indicates that significant teacher stability in relative effectiveness in producing student learning gains existed in this sample of experienced teachers (Brophy, 1973; Veldman and Brophy, 1974).

Furthermore, teachers' relative success within a given year tended to be general across student sex and M.A.T. subtests. Only four of the 165 teachers consistently did better with boys than girls, or vice versa, and only a few teachers consistently got better gains in language arts than in math, or vice versa.

There were class or cohort effects observable in the data, however. That is, even though student prescores were used to adjust post-scores (and thus theoretically hold student differences constant), correlations across subtests within the same year were notably higher than correlations across years, even for the same subtests. This means that teachers tended to be relatively high or relatively low on all subtests during a given year, even though the data were

residual (adjusted) gains rather than raw gains.

Thus, statistical techniques that theoretically hold student differences constant apparently do not succeed in overcoming this problem completely. One implication here is that even comparisons of residualized gain scores may not be fair to teachers, because certain student characteristics not taken into account in the adjusting process make it easier or harder for one teacher to succeed, compared to another, in a given year.

The results of these analyses, in addition to showing that relative differences in teacher effectiveness were statistically significant, reaffirmed the feasibility of identifying highly consistent teachers and studying them to seek associations between classroom process variables and student outcomes. However, before leaving this topic to discuss that research, one very important point should be made: the stability coefficients were statistically significant, but they were nowhere near as high as would be required to justify the use of such data for accountability purposes.

It simply is unfair and inappropriate to use norm referenced achievement test results for accountability purposes. There is too much doubt about the degree to which the data are valid. They may not accurately reflect teacher success in meeting their goals (some teacher goals are not measured by these tests), and stability from one year to the next is not high enough to allow such tests to be used with any confidence that they are measuring stable teacher behavior or teacher effects.

Correlates of Teaching Effectiveness

The study eventually termed the Texas Teacher Effectiveness Project was a two-year, replicated investigation of the correlates of teacher effectiveness, conducted in second and third grade classrooms. Thirty-one teachers were

observed for about 10 hours each the first year, and 28 were observed for about 30 hours each the second year. These teachers were chosen for observation because they were among the most consistent across time, across the five subtests for which data were available, and across the two sexes, in their relative effectiveness in producing student learning gains, as judged by class mean residual gain scores from subtests of the M.A.T. We selected these particular teachers for observational study because we felt that teachers who were both experienced in teaching at the grade level and consistent in their relative effectiveness in producing student learning probably would show the most consistent kinds of process-product relationships.

The teachers were observed with a multi-faceted, low inference coding system based upon the Dyadic Interaction System (Brophy & Good, 1970), but expanded to include several other variables, most notably the classroom management variables stressed by Kounin (1970). In addition, teachers were rated with several high inference measures of classroom variables, and presage data were collected through teacher interviews and questionnaires. All of these data were analyzed for both linear and non-linear relationships to outcome measures (mean residual gains across four consecutive years on each of the five M.A.T. subtests).

One basic finding was that the process-product data made much more sense when analyzed separately by low versus high socio-economic status (SES) groups than they did when analyzed for the sample as a whole. This means that, for many variables, teacher behavior optimal for producing student learning gains in low SES schools was different from teacher behavior optimal for producing learning gains in high SES schools.

Briefly, the more successful teachers in high SES schools focused heavily upon the curriculum and taught with high expectations and a critical demandingness

which included a willingness to criticize students who did not meet these expectations. The students themselves generally were eager and even competitive, so that most responded well to this kind of demanding instruction. Thus, at least for the purpose of maximizing cognitive outcomes, our data suggest that the high SES teachers got the best results when they pushed the students to their limits, teaching in quite traditional ways.

The teachers who were the most effective in low SES schools showed equally high expectations, but they differed dramatically in their behavior. This apparently was because the low SES students in these grades were alienated from learning and thus would not respond positively to attempts to push them. Their alienation did not show up in the form of aggressiveness or defiance. Instead, it appeared in the form of fear and anxiety. As a result, the low SES teachers who were most effective were patient and encouraging, willing to take up matters of personal concern and to develop their personal relationships with their students in addition to teaching the curriculum, willing to reteach and use substitute materials and methods until they found something that worked, and less satisfied with traditional curriculum materials and particularly with standardized tests, because they felt that these were inappropriate to their students' needs.

Both types of effective teachers had high expectations and firm determination to teach, but they used very different patterns which seemed optimally suited to their respective student populations. The findings from this study are discussed in detail in Learning from Teaching: A Developmental Perspective (Brophy & Evertson, 1975), as well as in numerous technical reports available through the Research and Development Center for Teacher Education.

In addition to reaffirming the importance of student differences in determining what constitutes optimal teacher behavior, our research produced

findings which contrast in many ways with previous research and with the contents of most teacher education textbooks. We believe that the reason for this is that most previous research, and in particular most teacher education textbooks, have assumed a teaching-learning situation in which students function at the concrete operational level, have mastered the fundamentals of the three R's and are able to use them for learning other content, and are able to conduct learning activities independently. Also, they assume that the primary type of teacher-student interaction is the kind of verbal interchange that occurs during classroom discussions.

All of this probably is true beginning around the fourth grade, but it clearly is not true prior to that time. Children up to about grade three still are at least partly in the preoperational stage of cognitive development, and the teaching-learning situation involves relatively little verbal discussion and much more instruction in psychomotor skills, drill, and exercise work concerning the fundamentals of the three R's. Most teacher questions are low level questions occurring in fast paced drills, and much of the day is spent working on seatwork assignments and getting individualized feedback from the teacher. There are few real class discussions.

This means, among other things, that classroom observation systems keyed to class discussions are minimally relevant to what goes on in the early grades. More importantly, it means that data collected using these instruments at higher grade levels do not usually generalize to the early grades. In short, many of the methods and approaches propounded in teacher education textbooks (indirect teaching, use of advance organizers and other aspects of the sequencing of verbal instruction, stress on divergent questioning or higher conceptual level of classroom discourse) probably are appropriate for older students who have mastered the fundamentals of the three R's and are capable of independent learning,

but they are inappropriate for teachers trying to teach these fundamentals to young students.

In fact, taking developmental considerations and differences in the teaching-learning situation together, we have concluded that teachers intending to work with children in the early elementary grades probably should be given different and more specific teacher education than teachers intending to work at higher grades. Among other things, this implies that our present organization of teacher training programs into elementary vs. secondary probably is somewhat inappropriate, and that we should have a separate program for teachers intending to work in kingergarten through grade three.

Another major implication of our data, which cuts across all of the above, is that teaching often is conceptualized and discussed in ways that we think are fundamentally incorrect. Dunkin and Biddle (1974), in their reveiw of research on teaching, call attention to the problems of premature commitments to particular methods of teaching. They criticize this from the perspective of research reviewers, noting that commitments to favorite methods sometimes cause researchers to simply assume that these methods are effective when there are no data to back them and/or to be biased in their design and interpretation of research relating to methods that they prefer.

We would carry this notion even further, pointing out that it is a fundamental misconception to state or even imply that effective teaching involves mastery and use of one or a small number of generalized teaching approaches. Instead, it seems intuitively obvious, although data from our own studies as well as from several others also support it, to assume that effective teaching involves the orchestration of a very large number of relatively limited principles linking specific stimulus situations to teaching responses that differ in probability of success or effectiveness.

Thus, while we hope, and in fact expect, that teaching increasingly will become an applied science as a data base to support prescriptive advice accumulates, we do not think that improvement will come in the form of data supporting a small number of teaching approaches that apply very broadly in most or all situations. Instead, we suspect that the accumulation of a data base about the relationships between particular needs and ideal teacher responses to these needs gradually will result in something analagous to medicine's Merck Manual. [1]

That is, we think that knowledge will be based on the accumulation of increasingly finer distinctions between different learning situations and different kinds of students, which in turn will support increasingly specific and detailed diagnoses. This in turn will make possible the specification of increasingly detailed prescriptive advice about how to respond to these situations.

Present Needs

For the moment, however, this is a futuristic pipe dream. Research on teaching literally is in its infancy, and the quantity of solid, data-based advice that we presently can give to teachers is surprinsingly limited. In view of this, certain changes in societal expectations and in the activities of teacher educators and educational researchers are in order.

First, although obvious lapses in ethics or other unprofessional behavior should not be tolerated, it is self-defeating and unreasonable to expect schools and teachers to solve all the problems of society, and to blame them if they fail to do so. In the first place, although it might be nice if it were otherwise, the amount that a given teacher can accomplish with a given student within the course of a given school year is limited, even under optimal conditions. Thus, even if we should succeed in maximizing teacher awareness and eliminating

[1] I am indebted to Carolyn M. Evertson for this analogy.

all undesirable self-fulfilling prophecy effects, and even if teachers should succeed in becoming optimally effective, they will not succeed in eliminating individual differences, now or ever. We need to focus on questions involving optimizing teaching to achieve the possible, and to stop expecting and exhorting teachers to do the impossible.

Also, teacher educators and educational researchers need to pay more attention to the accumulation of a data base that would allow truly prescriptive teacher education to emerge. Propounding ideas on the basis of commitments rather than supportive data is unscientific to say the least, and blowing with the wind by propounding the latest educational fad is even worse. However, educational researchers and critics of teacher education programs can expect little else until and unless we develop a data base that is significantly more useful for teacher education than what we have available at the moment.

We need less reliance on over-simplified and over-generalized variables, and less conceptualization of effective teaching as a matter of applying a few presumably "crucial" techniques in most or all situations. Instead, we need much finer descriptions of classroom learning, which will allow us to develop better variables and better ways to recognize and take into account situational differences. And, we need to shift attention from searches for effective teachers or even effective teaching to searches for reliable cause and effect relationships (with specification of relevant situations and limits on generalization).

Only through the gradual accumulation of this kind of scientific data base can we expect teaching to evolve into a truly applied science. Until then, terms like "effective teacher" and "effective teaching," and especially terms like "teacher accountability," will continue to have very little meaning or justification.

Footnotes

Because this is a position paper which draws conclusions and implications from a broad range of research, the author bears full responsibility for its contents. However, I wish to acknowledge and thank my many colleagues at the Research and Development Center for Teacher Education and elsewhere, who have contributed in important ways to the research and/or to my thoughts about it. In particular, I wish to acknowledge Carolyn Evertson, Thomas Good, and Donald Veldman.

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